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# A measure of anxiety symptoms among children

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**Abstract**

The Spence Children's Anxiety Scale (SCAS) is a child self-report measure designed to evaluate symptoms relating to separation anxiety, social phobia, obsessive–compulsive disorder, panic-agoraphobia, generalized anxiety and fears of physical injury. The results of confirmatory and exploratory factor analyses supported six factors consistent with the hypothesized diagnostic categories. There was support also for a model in which the 1st-order factors loaded significantly on a single 2nd-order factor of anxiety in general. The internal consistency of the total score and subscales was high and 6 month test–retest reliability was acceptable. The SCAS correlated strongly with a frequently used child self-report measure of anxiety. Comparisons between clinically anxious and control children showed significant differences in total SCAS scores, with subscale scores reflecting the type of presenting anxiety disorder of the clinical samples. © 1998 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

Anxiety disorders represent one of the most common forms of child psychopathology. Studies with community samples suggest that around 8–12% of children meet diagnostic criteria for some form of anxiety disorder that is sufficiently severe to interfere in daily functioning (Anderson et al., 1987; Costello, 1989). Anxiety disorders in children may present in a variety of forms, such as separation anxiety, social phobia, generalized anxiety, panic disorder with and without agoraphobia, obsessive–compulsive disorder and specific phobias. Child anxiety disorders are associated with a range of negative consequences in terms of social, scholastic and personal adjustment (Strauss et al., 1987; Messer and Beidel, 1994). Furthermore, there is evidence to suggest that childhood anxiety disorders are not transient phenomena for many children and that, if left untreated, may persist through adolescence and adulthood (Pfeffer et al., 1988; Keller et al., 1992). Thus, it is important that clinically anxious children are identified as early as possible and provided with appropriate intervention.


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Early intervention is dependent upon the availability of psychometrically sound, valid assessment instruments to identify children with anxiety problems. A structured interview represents one method of identifying anxious children, however most existing schedules are cumbersome to administer and are not practical as large scale screening instruments in schools. Child, teacher or parent questionnaires represent a more efficient method of identifying anxious children. Although there are several self-report measures of anxiety available for use with children, they suffer from two major limitations. First, most of the measures available to date are downward extensions of adult measures of anxiety and are based on the assumption that anxiety in children closely resembles the presenting features of anxiety in adults. For example, two of the most commonly used self-report measures of child anxiety, namely the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds and Richmond, 1978) and State–Trait Anxiety Inventory for Children (STAI-C; Spielberger, 1973), are both junior versions of their adult counterparts. Although evidence suggests a good deal of overlap between the presentation of anxiety problems among children and adults, clearly there are developmental differences in anxiety symptoms that need to be considered. Indeed, developmental differences in the presentation of anxiety disorders are recognized within the diagnostic criteria of *DSM-IV* (APA, 1994), through variation in the diagnostic criteria for specific anxiety disorders among children versus adults and through the inclusion of separation anxiety disorder as a problem specific to children. Only recently, however, have researchers attempted to develop assessment instruments that are empirically derived to assess anxiety symptoms among children. For example, the Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997) was developed to reflect the presenting symptoms of anxiety among children. However, its development was based on the presenting features of a clinical sample and therefore the results may not be generalizable to community samples. The present study describes a scale developed specifically to assess symptoms of anxiety with children in the general population.

A second limitation of most child-report measures of anxiety is the failure to examine anxiety symptoms that relate to specific anxiety disorders, such as social phobia or separation anxiety disorder. Rather, questionnaires such as the RCMAS or STAI-C include items relating to anxiety in general. In practice, the clinician typically requires information about the clustering of specific patterns of anxiety problems. Such information may provide indications as to the type of situations that the child finds difficult and may guide the content of treatment. Until recently, there was a lack of measures that differentially examine the symptoms of specific types of anxiety disorder. The SCARED (Birmaher et al., 1997) mentioned above is one of the few measures to assess different forms of anxiety disorder, with factors relating to generalized anxiety disorder, separation anxiety disorder, panic disorder, social phobia and school phobia. However, as noted previously, the SCARED was developed with clinically diagnosed anxious children and its validity with community samples is yet to be established. The present study examines a measure of child anxiety that includes subscales indicative of subtypes of anxiety disorder, initially developed with community samples of children.

Gradually, evidence has emerged to suggest that children do indeed experience clusters of anxiety symptoms as proposed by diagnostic classification systems such as *DSM-IV*. Although there is considerable comorbidity across anxiety disorders in children (Anderson, 1994),

evidence suggests that there is sufficient unique variance in subtypes of anxiety disorders to justify their retention as separate problem areas warranting individual consideration. A recent study reported by Spence (1997) suggested that anxiety symptoms in children do cluster in a manner predicted by the *DSM-IV* (APA, 1994) classification of anxiety disorders in children, although specific types of anxiety disorder load heavily on a 2nd-order factor of anxiety in general. Support was found for clusters of anxiety symptoms indicative of social phobia, separation anxiety disorder, agoraphobia/panic disorder and obsessive compulsive disorder. There was less support for a discrete category of generalized anxiety disorder, but the evidence did suggest an additional cluster of fears relating to fears of physical injury. Birmaher et al. (1997) also reported discrete anxiety factors for the SCARED generally in keeping with *DSM-IV* anxiety disorder categories. However, this study did not evaluate the extent to which correlations between factors could be explained by a common, 2nd-order factor.

The present paper describes a child-report measure (The Spence Children's Anxiety Scale; SCAS), developed for use with a community sample of children to assess child anxiety disorders (Spence, 1997). The measure was developed to examine a broad spectrum of anxiety symptoms among children, with items consistent with specific *DSM-IV* anxiety disorders. The current paper reports on the psychometric properties and convergent validity of the SCAS with a large community sample of children. First, the paper examines the factorial structure of the measure, in order to validate the six factor structure upon which the scale is hypothesized to be based. Second, the internal consistency and test–retest reliability were examined. Third, the convergent and discriminant validity of the scale was considered. It was predicted that the SCAS would be more strongly correlated with another measure of child anxiety than with a measure of depressive symptoms. A significant correlation between anxiety and depression would be expected, given the high level of comorbidity between childhood anxiety and depression (Curry and Murphy, 1995). However, this relationship was not predicted to be as strong as that between the two measures of anxiety. Fourth, the clinical utility of the SCAS was examined with two samples of clinically diagnosed anxious children in comparison to a matched sample of non-anxious children. Finally, the paper reports on age and gender differences in SCAS total and subscale scores for comparative purposes.

The data reported in this paper builds on previous work with the SCAS reported by Spence (1994, 1997). First, the paper reports on an additional, large community sample of children ($N = 594$) for whom the factor structure of the SCAS was examined. In this regard, the paper is a replication of the confirmatory factor analytic study reported by Spence (1997), using a different community sample of children. Second, the study reports the test–retest reliability of the SCAS and convergent and divergent validity through the association of the SCAS with other measures of anxiety and a measure of depressive symptoms. Third, the convergent validity of the scale was examined by comparing results on the SCAS for a sample of clinically diagnosed children with those for a matched group of non-clinical children. The only overlap in samples reported by Spence (1997) and the present paper is in the reporting of age and gender effects and the total internal consistency of the scale. For the age by gender analyses, the 1,396 children involved in the Spence (1997) study were combined with the further groups of children for whom the new factor analysis and test–retest analyses were conducted, providing a much larger sample size.

## 2. Method

### 2.1. Participants

The major sample involved in the acquisition of normative data included a community sample of 2,052 children, 8–12 years of age (mean age = 10.11, S.D. = 1.25). The sample consisted of 851 (42%) males and 1201 (58%) females. The gender mix reflected the greater number of girls attending the participating schools. Children were in grades 4 to 7 of sixteen urban Catholic primary schools in the city of Brisbane, Australia. Schools were selected as being representative of the socio-economic structure and ethnic backgrounds of the Australian population in general, based on local census information. The majority of children attending these schools were from anglo-saxon, lower-to-middle income families. Approximately 20% of children were from families in which one or both parents were born overseas, with Asian, Latin-American and European backgrounds. No significant differences were found between the demographic characteristics of ethnic background, income and unemployment levels for the census data of the catchment areas of the schools involved in the study and these characteristics for Australia in general. The ethical committees involved in the present study did not permit the collection of data relating to ethnic background and parental income or occupation from the children themselves.

Written informed consent was obtained from parents and children before participation in the study. Despite the use of incentives to participate (Hungry Jack's free sundae vouchers), the return rate for parental consent forms was variable across schools, ranging from 40 to 95%. Overall, approximately 75% of parents and children who were approached to take part in the study agreed to participate. To participate, all children were required to speak and write English competently, as judged by their class teacher.

Subsets from this sample were involved in specific aspects of the study, such as collection of test–retest reliability data for the SCAS and evaluation of convergent and discriminant validity of the SCAS in relation to other measures. Specific details regarding age and gender of each subset of children are provided below.

In addition to the community based samples, the validity of the SCAS was examined with a clinical population. This study involved three groups of children, namely clinically-referred social phobic, clinically-referred comorbid social-separation anxious and a non-clinical control group. The social phobic group included 20 children who were diagnosed as meeting *DSM-IV* criteria for social phobia using a revised version of the children's anxiety interview schedule for children (parents version) (ADIS-C/P; Silverman and Nelles, 1988). When the study commenced, the *DSM-IV* version of the ADIS-C/P was not yet available, thus the *DSM-III-R* version of the ADIS-C/P was modified to meet *DSM-IV* criteria. These children had been referred to a child anxiety clinic at the University of Queensland. The social phobic children were matched in terms of age, gender and socio-economic status with a group of 20 children who were diagnosed with co-morbid social phobia plus separation anxiety disorder and a matched sample of 20 non-clinical control children. The control group was recruited from local schools and contacts of the researchers. Parents of the non-clinical sample were interviewed using the ADIS-C/P to ensure that these children did not meet any clinical diagnostic criteria. There were 9 boys and 11 girls in each group, of mean age 9.40 years (S.D. = 1.63).

## 2.2. Measures

### 2.2.1. Spence Children's Anxiety Scale (SCAS; Spence, 1997)

This measure consists of 44 items, of which 38 reflect specific symptoms of anxiety and 6 relate to positive, filler items to reduce negative response bias. Of the 38 anxiety items, independent judges considered 6 to reflect obsessive–compulsive problems, 6 separation anxiety, 6 social phobia, 6 panic/3 agoraphobia, 6 generalized anxiety/overanxious symptoms and 5 items concerned fears of physical injury. Items are randomly allocated within the questionnaire. Children are asked to rate on a 4 point scale involving *never* (0), *sometimes* (1), *often* (2) and *always* (3), the frequency with which they experience each symptom. The instructions state "Please put a circle around the word that shows how often each of these things happens to you. There are no right and wrong answers". Given that the scale examines the occurrence of objective, clinical symptoms, it was considered appropriate to apply a frequency scale, rather than an intensity scale. This was justified given the findings of McCathie and Spence (1991) that there was no indication that severity or intensity ratings provided a better reflection of childrens fears and anxiety than a dimension assessing frequency of occurrence of each fear. The 0–3 ratings on the SCAS are summed for the 38 anxiety items to provide a total score (maximum = 114), with high scores reflecting greater anxiety symptoms. Scores may also be produced for the anxiety subscales using items as outlined in Table 3. There are six, positively worded filler items. These include item 11 (I am popular among other kids my own age), item 17 (I am good at sports), item 26 (I am a good person), item 31 (I feel happy), item 38 (I like myself) and item 43 (I am proud of my school work). Responses to each of the positively-worded filler items are ignored in the scoring process.

Further details regarding the development of the measure are provided by Spence (1997). The items were selected from an initial pool of 80 items generated to reflect a broad spectrum of anxiety symptoms. The items were selected from a review of existing literature, clinical experience of 4 clinical psychologists who specialize in anxiety disorders, existing child anxiety assessment measures, structured clinical interviews (e.g. anxiety disorders interview schedule for children; Silverman and Nelles, 1988), the *DSM-III-R* (APA, 1987) and *DSM-IV* (APA, 1994) diagnostic criteria and background information. Items were deleted if they clearly pertained to a specific trauma event or medical condition.

The 80 items were then examined by a further 6 clinical psychologists who specialize in child anxiety disorders and who are highly experienced in the use of the *DSM-IV* diagnostic system. These judges were asked to determine independently (a) into which *DSM-IV* diagnostic categories they would predict that each item would best fit, if this was possible and (b) whether each item could be easily read and understood by children aged 8–12 years. There was high agreement between judges with 73 of the 80 items being allocated into the same, specific *DSM-IV* category by at least 5 of the 6 judges. Furthermore, there were at least 6 anxiety symptoms allocated to each of the *DSM-IV* diagnostic categories.

However, two problems emerged in the development of the measure. The first concerned the specific phobia items. Specific phobia, by definition in *DSM-IV*, relates to a single fear stimulus. The specific phobia items identified by the judges concerned a wide range of specific fears, mainly relating to physical injury (e.g. dogs, dentists, doctors, heights). Thus, it was decided to replace the specific phobia category with a dimension related to fears of physical

injury. This decision was considered justified given experimental evidence to suggest that children's fears tend to cluster together within dimensions relating to social and physical threat (Campbell and Rapee, 1994). The second problem concerned the *DSM-IV* criteria for generalized anxiety disorder, for which symptoms relating to concentration, fatigue, irritability, restlessness, sleep disturbance and muscle tension had not been allocated consistently into specific diagnostic categories by the judges. As a result, there were insufficient items to justify an independent category of generalized anxiety disorder category. However, three somatic items were included in the checklist that fit into the DSM-III-R category of overanxious disorder and these were added to produce a combined overanxious/generalized anxiety disorder category.

Pilot work was then conducted to confirm that children were able to understand the items. This deleted the 'fear of fear' and 'fear of losing control or going crazy' items relating to panic disorder, the concept of which was too complex for many of the children to understand. Items were also excluded if they were highly overlapping in content. The final list contained 38 items which reflected a wide spectrum of anxiety symptoms in children.

Confirmatory factor analysis of responses from the first cohort of children examined by Spence (1997) indicated that a model involving 6 discrete but correlated factors, reflecting the areas of panic/agoraphobia, social phobia, separation anxiety, obsessive–compulsive problems, generalized anxiety and physical fears, provided an excellent fit of the data. The high level of covariance between latent factors was satisfactorily explained by a higher-order model, in which each 1st-order factor loaded on a single 2nd-order factor. The findings were replicated with a second cohort of children and were equivalent across genders.

An unpublished pilot study relating to the psychometric properties of the scale was reported by Spence (1994). This initial study involved a sample of 311 children aged 8–12 years and revealed an internal reliability co-efficient alpha of 0.93 for the SCAS and Guttman split-half reliability of 0.92. The mean total score was 30.56 (S.D. = 16.75). The total score on the SCAS correlated highly ($r = 0.73$, $p < 0.001$, $N = 311$) with the revised children's manifest anxiety scale (Reynolds and Richmond, 1978) and significantly with mothers' ratings of internalizing problems ($r = 0.34$, $p < 0.01$, $N = 101$), but not externalizing problems, on the child behavior checklist (Achenbach, 1991). Exploratory factor analysis with the pilot sample revealed clear factors relating to panic/agoraphobia, separation anxiety, physical fears, social anxiety and obsessive–compulsive disorder. However, items relating to generalized anxiety split across 2 factors (Spence, 1994). A copy of the scale may be obtained from the author upon request.

*2.2.2. Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds and Richmond, 1978)*

This checklist measures physiological symptoms, worry and inattentiveness associated with anxiety problems in children. It has been shown to have good psychometric properties and to provide elevated scores for children experiencing anxiety problems in comparison to non-clinical control children (Reynolds and Richmond, 1978). However, the scale does not reliably discriminate between anxious children and those with other forms of psychopathology (Perrin and Last, 1992). Although the RCMAS does not provide information about experience of specific anxiety disorders, it does give an indication of overall anxiety levels. Thus, it was predicted that the RCMAS would be correlated significantly with the SCAS in the present study and provide an indicator of convergent validity.

*2.2.3. The Children's Depression Inventory (CDI; Kovacs, 1981)*

The Children's Depression Inventory is a commonly used self-report measure of depressive symptoms for children of 7 to 17 years of age. The scale has 27 items dealing with sadness, self-blame, insomnia, loss of appetite, interpersonal relationships and school adjustment. For each item, there are three alternatives yielding a possible score of 0, 1 or 2, with high scores reflecting more severe depression. The scale has high internal consistency (Orvaschel et al., 1980) and test–retest reliability (Kovacs, 1981) and correlates highly with clinician ratings of depression (Matson, 1989). Given the high level of comorbidity between anxiety and depression in children, it was predicted that the SCAS would correlate significantly with the CDI. However, given that there is also evidence of unique variance in measures of anxiety and depression, with both overlapping and unique factors contributing to aetiology (Thapar and McGuffin, 1997), it was predicted that the correlation between the SCAS and the CDI would be significantly lower than that found between the SCAS and the RCMAS.

*2.2.4. The Child Behavior Checklist (CBCL; Achenbach, 1991)*

Information relating to children's internalizing symptoms was obtained for a subsample of 218 children from 3 schools. The CBCL internalizing scale was selected as an indicator of convergent validity of the SCAS, through use of an independent informant. The CBCL includes 118 items describing child behavior problems, to which parents are asked to respond on a 3 point scale whether that behavior is '*not true*', '*somewhat or sometimes true*' or '*very true or often true*' of their child's behavior now or over the past 6 months. Only the internalizing scale was used in the analyses for the present study. The CBCL has been widely used as an assessment of child behavior problems and has been demonstrated to have adequate psychometric properties.

*2.2.5. Revised Version of Children's Anxiety Interview Schedule for Children (Parents Version) (Silverman and Nelles, 1988)*

At the time the study commenced, the *DSM-IV* version of the ADIS-C/P was not yet available, thus the *DSM-III-R* version of the ADIS-C/P was modified to meet *DSM-IV* criteria. Subsequently the anxiety disorders interview schedule for *DSM-IV* (parent version) (ADIS-C/P; Albano and Silverman, 1996) was developed which has a great deal in common with the revised ADIS-P used in the present study. The ADIS-C/P has been widely used as a diagnostic instrument for the identification of child anxiety disorders. Several studies have confirmed the reliability of the *DSM-III-R* version of the ADIS-C/P through inter-diagnostician agreement (Silverman, 1991; Rapee et al., 1994). In order to confirm the inter-assessor agreement of the revised ADIS-C/P used in the present study, reliability checks were conducted on 30% of randomly selected parent interviews, which were audiotaped. Reliability co-efficients are reported below.

*2.3. Procedure*

All children in the community sample of 2,052 completed the SCAS and the RCMAS in counterbalanced order. Questionnaire items were read aloud to children by the research

assistants and were administered on a grade basis. Two researchers were present during all administrations, in order to assist any children who had difficulties in completing the questionnaires.

The relationship between the SCAS, RCMAS, the CDI and parent report on the CBCL internalizing scale was assessed using a subsample of 218 children and their parents from 3 of the schools outlined above. Following receipt of written informed consent from parents, children completed the SCAS, RCMAS and CDI in grade-based groups of approximately 20–40 students per group. Again, questionnaires were counterbalanced across classes in order to control for order effects. One experimenter read the questionnaire items aloud while the other assisted children where necessary. Children were not required to put their name on the questionnaires, but were allocated a family code through which they could be identified for the retest session and matched up with their parent report data. Children were then given a questionnaire package to take home. This package included the CBCL for completion by the mother with a request that it be returned to the school in a sealed envelop, marked only with the identifying code that was held by the researchers. Six month test–retest reliability data for the SCAS was obtained from 344 children selected from these same three schools. This sample included most of the 218 children described above.

A further sample of children involved three groups, namely clinically-referred social phobic children, clinically-referred comorbid social-separation anxious children and non-clinical control group. The clinically diagnosed children had been referred to an child anxiety disorders clinic at the University of Queensland and had been selected for participation in a separate study that examined the behavioural and cognitive features and treatment of children with social phobia. The social phobic group included 20 children who were diagnosed as meeting *DSM-IV* criteria for social phobia using a revised version of the children's anxiety interview schedule for children (parents version) (ADIS-C/P; Silverman and Nelles, 1988). All children were required to have a clinician's rating of at least 4 on the 0–8 point severity rating scale of the ADIS-C/P. At the time the study commenced, the *DSM-IV* version of the ADIS-C/P was not yet available, thus the DSM-III-R version of the ADIS-C/P was modified to meet *DSM-IV* criteria. The social phobic children were matched in terms of age, gender and socio-economic status with a group of 20 children who were diagnosed with co-morbid social phobia plus separation anxiety disorder and a matched sample of 20 non-clinical control children. These children met the diagnostic criteria for both social phobia and separation anxiety disorder, with a severity rating of at least 4 on the modified ADIS-C/P. The control group was recruited from local schools and contacts of the researchers. Parents of the non-clinical sample were interviewed to ensure that these children did not meet any clinical diagnostic criteria using the ADIS-C/P.

Inter-assessor agreement of diagnoses for 29 interviews showed a kappa of 1 (perfect agreement) for anxiety disorder diagnosis versus no diagnosis, 0.83 for social phobia as a principal diagnosis, 0.91 for social phobia in the profile, 0.90 for a principal diagnosis of separation anxiety disorder and 0.95 for separation anxiety disorder in the profile.

## 3. Results

### 3.1. Confirmatory factor analysis

Confirmatory factor analysis was conducted using a subsample of the children from 6 of the schools in the study ($N$ = 584) to confirm that the factor structure of the measure did indeed reflect the 6 dimensions of anxiety disorder that the SCAS purported to evaluate. This sample included children aged 9–12 years (mean = 10.32, S.D. = 1.12) and consisted of 257 boys and 327 girls. The data were examined using EQS (Bentler, 1995) with elliptical re-estimated least squares (ERLS) estimation using the correlation matrix. ERLS estimation was selected given that tests of normality revealed evidence of significant positive skewness and kurtosis among many of the questionnaire items. This reflected the nature of the problem checklist in the majority of children did not report high frequency of symptoms. Estimation methods such as maximum likelihood (ML) which rely upon assumptions of normality were not therefore considered appropriate. Rather, the ERLS estimation method was considered preferable given that this method of estimation allows variables to share a common, non-zero kurtosis parameter, which was the case in the present data set (Anderson and Gerbing, 1988; Bentler, 1995). However, ERLS still does not overcome the problems of skew in the data. The sample size was not considered large enough to justify use of arbitrary distribution estimation methods which would have overcome both skew and kurtosis problems. Thus, the ERLS estimation method was selected as the most appropriate method available although, given the skew in the data, the results should be treated with caution. In support of the validity of the findings, the results using ML solution mirrored those produced by ERLS estimation, although the goodness of fit indices were somewhat lower.

It was hypothesized that the data would be best explained by a 6, correlated factor model in which questionnaire items loaded upon factors relating to social phobia, separation anxiety, obsessive–compulsive problems, panic/agoraphobia, fears of physical injury and generalized anxiety disorder. The confirmatory factor analysis reported here represents a replication of the study reported by Spence (1997) using a further sample. Four models were compared namely (i) a single factor, (ii) six uncorrelated factors, (iii) six correlated factors and (iv) six factors loading onto a single 2nd-order factor. Further details regarding each of these models are provided below. It was predicted that the factors would be strongly intercorrelated, given evidence of high levels of comorbidity between child anxiety disorders (Anderson, 1994). Further, in line with the results of Spence (1997), it was predicted that this high degree of intercorrelation between factors could be explained by a single, higher order factor of anxiety in general. Only anxiety items were included in the analyses, with positively worded filler items being excluded. In all instances, the iterative estimation procedure converged, all matrices were positive definite and no parameter estimate problems were encountered.

### 3.2. Model 1 (single factor)

The single factor model examined the degree to which all symptoms can be regarded as assessing a single, homogeneous dimension of anxiety rather than reflecting clusters of anxiety symptoms. All SCAS question items loaded significantly ($p < 0.01$) upon the single factor,

Table 1
Fit indexes for each model, with comparisons between models

| Model | $\chi^2$ | *df* | *p* | NFI | NNFI | CFI | Comparison | $\chi^2$ change | *df* change | *p* of $\chi^2$ change |
|---|---|---|---|---|---|---|---|---|---|---|
| Null model | 23,777 | 703 | | | | | | | | |
| Model 1: 1 factor | 1,952 | 666 | < 0.001 | 0.92 | 0.94 | 0.94 | model 1 versus 3 | 558 | 16 | < 0.001 |
| Model 2: 6 uncorrelated factors | 3,499 | 665 | < 0.001 | 0.85 | 0.87 | 0.88 | model 2 versus 3 | 2,105 | 5 | < 0.001 |
| Model 3: 6 correlated factors | 1,394 | 650 | < 0.001 | 0.94 | 0.97 | 0.97 | null versus model 3 | 22,383 | 53 | < 0.001 |
| Model 4: 6 first-order factors, 1 second-order factor | 1,497 | 659 | < 0.001 | 0.94 | 0.96 | 0.96 | model 4 versus model 3 | target coefficient = 0.93 | | |

with loadings greater than 0.44. Table 1 indicates that the 1 factor solution represents a reasonably good fit of the data in terms of the normed fit index (NFI), non-normed fit index (NNFI) and comparative fit index (CFI). Values for NFI, NNFI and CFI greater than 0.90 indicate a relatively good fit of the model to the data. However, the chi-square statistic for the model was significant, chi-square (666) = 1952, $p < 0.001$, indicating that the parameters of the model differed significantly from those of the data set. Significant chi-square statistics are not unusual where large sample sizes are involved, even though the fit indices indicate a relatively good fit of the model to the data (Marsh, 1994). In order to determine whether the one factor solution provided a better fit of the data than did the six correlated factor model, the chi-square values of the two models were compared in relation to changes in the degrees of freedom. The change in the chi-square statistic between the single factor model and the six correlated factor model, in relation to the change in the degrees of freedom, indicated a significantly better fit of the data for the six correlated factor model, as shown in Table 1.

### *3.3. Model 2 (six uncorrelated-orthogonal factors)*

The confirmatory factor analysis loaded each questionnaire item of the SCAS onto a latent factor that represented the dimension of anxiety that the item was hypothesized to measure, as shown in Table 1. However, the factors were not allowed to intercorrelate in model 2. The fit indices for this model indicate a relatively poor fit of the data, with fit indices below 0.90. The change in chi-square statistic in relation to change in the degrees of freedom between the six correlated and six uncorrelated factor solutions indicated a significantly better fit of the data by the six correlated factor model.

### 3.4. Model 3 (six correlated factors)

The six, correlated factor model fixed the factor loadings so that questionnaire items loaded uniquely on the latent factor (anxiety disorder dimension) that the item was hypothesized to reflect. However, the factors were allowed to intercorrelate. The factor loadings of each SCAS item upon the hypothesized latent factor are show in Table 2. Factor loadings were all statistically significant, with standardized values exceeding 0.40. A high degree of intercorrelation between factors was found as shown in Table 3. However, when the standard errors of the correlations were considered, only one of the confidence intervals (for the correlation between separation anxiety and fears of physical injury) included the value of unity. Thus, it is unlikely that the factors of the scale can be considered as assessing exactly the same dimension.

The NFI, NNFI and CFI values for this model all exceeded 0.90 and suggest a relatively good fit of the model to the data. Furthermore, as previously noted the six correlated factor model represented a significantly better fit than the 1 factor, or six uncorrelated factor models. Although the chi-square value indicated a significant difference between the parameters of the data and the model, chi-square (650) = 1394, $p < 0.001$, it is important to note that Marsh et al. (1988) stressed the difficulty in obtaining non-significant chi-square values with large sample sizes. Thus, in view of the strong fit indices, it would be inappropriate to reject the model on the basis of the chi-square statistic. Taken together, the fit indices suggest that the six correlated factor model provided a good fit of the data.

### 3.5. Model 4 (six correlated factors loading onto one higher order factor)

The higher order model examined the degree to which the intercorrelation between factors could be explained by a single, 2nd-order factor representing a general dimension of anxiety problems. The loadings of the 1st-order factors upon the 2nd-order factor were all significant ($p < 0.01$). Factor loadings upon the 2nd-order factor were 0.87 for panic/agoraphobia, 0.91 for separation anxiety, 0.87 for social phobia, 0.82 for physical injury fears, 0.83 for obsessive–compulsive problems and 0.93 for generalized anxiety. The percentages of unique variance accounted by each subscale factor were panic-agoraphobia = 24%; separation anxiety = 17%; social phobia = 24%; physical injury fears = 33%; obsessive–compulsive = 31% and generalized anxiety = 14%. The remainder of the variance for each factor could be explained by the 2nd-order factor, justifying use of a total score, in addition to the subscale values.

Table 2 shows values for NFI, NNFI and CFI in excess of 0.90 indicating that the 2nd-order model explained the data well. However, it is important to note that the fit of a 2nd-order factor model cannot exceed the fit of the corresponding model involving the correlated 1st-order factors alone. Higher order factors are merely attempting to explain the covariation between the 1st-order factors (Marsh and Hocevar, 1985). Thus, it is not appropriate to compare the level of fit of the 2nd-order versus the 1st-order model. Rather, the aim is to determine whether the higher order model provides a satisfactory explanation for the covariance between the 1st-order factors. In order to do so, Marsh and Hocevar (1985) suggest the use of a target coefficient, that is the ratio of the chi-square value of the 1st-order model to the chi-square of the 2nd-order model. The target coefficient has an upper limit of 1, which

Table 2
Confirmatory factor analysis loadings of anxiety symptoms on predicted six factors

| Predicted *DSM-IV* category | Questionnaire items | Factor loadings F1 | F2 | F3 | F4 | F5 | F6 |
|---|---|---|---|---|---|---|---|
| Panic attack and agoraphobia | (13) I suddenly feel as if I can't breathe when there is no reason for this | 0.44 | — | — | — | — | — |
| | (21) I suddenly start to tremble or shake when there is no reason for this | 0.67 | — | — | — | — | — |
| | (28) I feel scared if I have to travel in the car, or on a bus or a train | 0.47 | — | — | — | — | — |
| | (30) I am afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds) | 0.59 | — | — | — | — | — |
| | (32) All of a sudden I feel really scared for no reason at all | 0.76 | — | — | — | — | — |
| | (34) I suddenly become dizzy or faint when there is no reason for this | 0.54 | — | — | — | — | — |
| | (36) My heart suddenly starts to beat too quickly for no reason | 0.69 | — | — | — | — | — |
| | (37) I worry that I will suddenly get a scared feeling when there is nothing to be afraid of | 0.71 | — | — | — | — | — |
| | (39) I am afraid of being in small closed places, like tunnels or small rooms | 0.51 | — | — | — | — | — |
| Separation anxiety disorder | (5) I would feel afraid of being on my own at home | — | 0.55 | — | — | — | — |
| | (8) I worry about being away from my parents | — | 0.63 | — | — | — | — |
| | (12) I worry that something awful will happen to someone in my family | — | 0.51 | — | — | — | — |
| | (15) I feel scared if I have to sleep on my own | — | 0.58 | — | — | — | — |
| | (16) I have trouble going to school in the mornings because I feel nervous or afraid | — | 0.51 | — | — | — | — |
| | (44) I would feel scared if I had to stay away from home overnight | — | 0.53 | — | — | — | — |
| Social phobia | (6) I feel scared when I have to take a test | — | — | 0.60 | — | — | — |
| | (7) I feel afraid if I have to use public toilets or bathrooms | — | — | 0.43 | — | — | — |
| | (9) I feel afraid that I will make a fool of myself in front of people | — | — | 0.67 | — | — | — |
| | (10) I worry that I will do badly at my school work | — | — | 0.56 | — | — | — |
| | (29) I worry what other people think of me | — | — | 0.68 | — | — | — |
| | (35) I feel afraid if I have to talk in front of my class | — | — | 0.48 | — | — | — |
| Physical injury fears | (2) I am scared of the dark | — | — | — | 0.60 | — | — |
| | (18) I am scared of dogs | — | — | — | 0.44 | — | — |
| | (23) I am scared of going to the doctors or dentists | — | — | — | 0.52 | — | — |
| | (25) I am scared of being in high places or lifts (elevators) | — | — | — | 0.41 | — | — |
| | (33) I am scared of insects or spiders | — | — | — | 0.55 | — | — |

Table 2—*Continued*

Table 2—*Continued*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Obsessive—compulsive disorder | (14) I have to keep checking that I have done things right (like the switch is off, or the door is locked) | — | — | — | — | 0.52 | — |
| | (19) I can't seem to get bad or silly thoughts out of my head | — | — | — | — | 0.55 | — |
| | (27) I have to think of special thoughts to stop bad things from happening (like numbers or words) | — | — | — | — | 0.56 | — |
| | (40) I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order) | — | — | — | — | 0.42 | — |
| | (41) I get bothered by bad or silly thoughts or pictures in my mind | — | — | — | — | 0.67 | — |
| | (42) I have to do some things in just the right way to stop bad things happening | — | — | — | — | 0.61 | — |
| Generalized anxiety disorder/ overanxious disorder | (1) I worry about things | — | — | — | — | — | 0.61 |
| | (3) When I have a problem, I get a funny feeling in my stomach | — | — | — | — | — | 0.50 |
| | (4) I feel afraid | — | — | — | — | — | 0.59 |
| | (20) When I have a problem, my heart beats really fast | — | — | — | — | — | 0.54 |
| | (22) I worry that something bad will happen to me | — | — | — | — | — | 0.68 |
| | (24) When I have a problem, I feel shaky | — | — | — | — | — | 0.66 |

would be possible only if the covariance between 1st-order factors could be totally explained by the 2nd-order factor. A target co-efficient greater than 0.90 suggests that the 2nd-order factor provides a good explanation for the covariance between factors. Comparison of the chi-square values of the six correlated factor model and the higher order model produced a target coefficient of 0.93. This result suggests that the higher order model did indeed provide a satisfactory explanation for the covariance between 1st-order factors and an adequate fit of the data.

### *3.6. Exploratory factor analysis*

In order to examine whether questionnaire items also cross-loaded onto other factors, an exploratory factor analysis was conducted. Principal components extraction was used, with varimax rotation for the sample of 584 children outlined above. The analysis produced 7 factors with an eigenvalue greater than 1. The scree test revealed 6 or 7 factors, but the 7 factor solution produced one factor with only 3 items and a less meaningful solution. The six factor solution was therefore selected as being the most parsimonious, and accounted for 47% of the variance in SCAS scores. The results of this factor analysis revealed factors relating to (1) panic/agoraphobic (eigenvalue = 10.87, 27% of variance), (2) social phobia (eigenvalue = 1.92, 5% variance), (3) separation anxiety (eigenvalue = 1.57, 4% of variance), (4) obsessive–compulsive problems (eigenvalue = 1.25, 3% of variance), (5) physical injury fears (eigenvalue = 1.18, 3% of variance) and (6) generalized anxiety (eigenvalue = 1.06, 3% of variance). Of the 38 SCAS items, 32 showed a factor loading in excess of 0.40 upon their

Table 3
Standardized intercorrelations between latent factors

| Factor | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| (1) Panic/agoraphobia | | | | | | |
| (2) Separation anxiety | 0.79 | | | | | |
| (3) Social phobia | 0.70 | 0.77 | | | | |
| (4) Physical injury fears | 0.66 | 0.91 | 0.78 | | | |
| (5) Obsessive–compulsive | 0.80 | 0.77 | 0.67 | 0.55 | | |
| (6) Generalized anxiety | 0.82 | 0.78 | 0.87 | 0.74 | 0.78 | |

hypothesized factor. Only two of these items cross loaded upon other factors. These were item 7 (I feel afraid if I have to use public toilets or bathrooms) which loaded significantly upon both separation and social anxiety dimensions and item 30 (I am afraid of being in crowded places) which cross loaded on the panic/agoraphobia and the separation anxiety factors. Three items loaded upon a factor that was not predicted in the development of the questionnaire. Item 2 (I am scared of the dark) loaded significantly upon the separation anxiety factor, rather than the physical fear factor. Item 16 (I have trouble going to school in the mornings because I feel nervous or afraid) loaded significantly upon the social phobia factor, rather than separation anxiety. Item 24 (when I have a problem, I feel shaky) loaded significantly upon the panic factor, rather than the hypothesized generalized anxiety factor. Interestingly, it is understandable the children could interpret these items in a manner that would explain their loading on the factor concerned. Finally, three items failed to show a loading greater than 0.40 on any factor. These included item 20 (when I have a problem, my heart beats really fast), item 22 (I worry that something bad will happen to me) and item 39 (I am afraid of being in small closed places, like tunnels or small rooms). Thus, the exploratory factor analysis demonstrated that the SCAS items largely loaded upon factors reflecting dimensions that the items purported to measure.

### *3.7. Internal consistency and test–retest reliability*

Internal consistency was examined using the total sample of 2052 children. The analysis produced a co-efficient alpha of 0.92 and a Guttman split half reliability of 0.90. The internal consistency of the subscales was also acceptable, with coefficient alphas of 0.82 (panic-agoraphobia); 0.70 (separation anxiety); 0.70 (social phoba); 0.60 (physical injury fears); 0.73 (obsessive–compulsive) and 0.73 (generalized anxiety).

Test–retest data was available for 344 children who were reassessed 6 months after the initial data collection. This analysis showed a 6 month test–retest reliability correlation coefficient of 0.60 for the total score on the SCAS. The temporal stability (correlation) of the subscale scores were 0.45 for panic-agoraphobia; 0.57 for separation anxiety; 0.57 for social phobia; 0.54 for physical injury fears; 0.53 for obsessive–compulsive problems and 0.56 for generalized anxiety. Table 4 shows the mean values for subscale and total SCAS scores at the two assessment points. Repeated measures ANOVAs were conducted to examine changes in scores over time. Significant decreases in scores were found for the SCAS total score and all subscales except panic-agoraphobia over the six month period (panic-agoraphobia $F(1, 342) = 3.34$, $p = 0.07$;

Table 4
Mean scores and standard deviations for each occasion in 6 month test–retest analyses ($N$ = 344)

| | Time 1 | | Time 2 | |
|---|---|---|---|---|
| Factor | mean | S.D. | mean | S.D. |
| Panic/agoraphobia | 4.03 | 4.13 | 3.56 | 4.16 |
| Separation anxiety | 4.29 | 3.20 | 3.73 | 3.41 |
| Social phobia | 5.45 | 3.45 | 5.03 | 3.49 |
| Physical injury fears | 3.53 | 2.87 | 3.17 | 2.65 |
| Obsessive–compulsive | 5.54 | 3.65 | 4.65 | 3.63 |
| Generalized anxiety | 5.75 | 3.22 | 5.14 | 3.34 |
| Total SCAS Score | 28.59 | 16.49 | 25.28 | 17.36 |

separation anxiety $F(1, 342) = 11.41$, $p < 0.001$; social phobia $F(1, 342) = 5.24$, $p < 0.05$; physical injury fears $F(1, 342) = 6.90$, $p < 0.01$; obsessive–compulsive problems $F(1, 342) = 20.43$, $p < 0.05$ and generalized anxiety $F(1, 342) = 14.50$, $p < 0.001$). These results suggest that children's reports of anxiety symptoms tend to decrease after a six month retest interval. However, it is not clear the extent to which this reflects the impact of retesting or a genuine decline in the reporting of anxiety symptoms with age (see Section 3.9).

### *3.8. Convergent and discriminant validity*

Convergent validity was examined through intercorrelation of SCAS scores with other measures that purport to assess the construct of anxiety, namely the revised children's manifest anxiety scale and internalizing scores reported by mothers on the child behavior checklist. Two hundred and eighteen children and their parents were involved in this phase of the study. The Pearson product–moment correlation between SCAS total scores and the RCMAS total score was 0.71 ($N$ = 218, $p < 0.001$). Each subscale also correlated significantly with the RCMAS total score (panic-agoraphobia, $r = 0.56$; separation anxiety, $r = 0.56$; social phobia, $r = 0.58$; injury fears, $r = 0.50$; obsessive–compulsive, $r = 0.52$ and generalized anxiety, $r = 0.61$; $p < 0.001$ in all cases). Correlations were much lower between the RCMAS lie scale and the SCAS total score, $r = 0.05$, and the SCAS factor scores (panic-agoraphobia, $r = 0.07$; separation anxiety, $r = -0.09$, social phobia, $r = -0.003$, injury fears, $r = 0.01$, obsessive–compulsive, $r = 0.07$ and generalized anxiety, $r = 0.006$). Indeed, the correlation between SCAS total scores and the RCMAS lie score was differentially lower than the correlation between the SCAS total score and the RCMAS anxiety score using the procedure outlined by Meng et al. (1992), $Z = 24.91$, $N = 2052$, $p < 0.001$, one tailed test.

Correlations were then examined between scores for the SCAS and child-report on the children's depression inventory. These analyses made use of the same subsample of 218 children. The results showed a strong correlation between SCAS total scores and scores on the CDI ($r = 0.48$, $p < 0.01$). In addition, each of the subscales on the SCAS correlated significantly with the CDI scores (panic-agoraphobia, $r = 0.44$; separation anxiety, $r = 0.38$; social phobia, $r = 0.41$; injury fears $r = 0.33$; obsessive–compulsive, $r = 0.37$ and generalized anxiety, $r = 0.32$; $p < 0.01$ in all cases). Although the correlations between the SCAS subscales

and the CDI were statistically significant, the percent of variance in common was relatively low, ranging from 10 to 19%. The correlation between the SCAS total score and the CDI was significantly lower than the correlation between the SCAS total score and the RCMAS anxiety score, $Z = 4.77$, $N = 218$, $p < 0.001$, using the method described by Meng et al. (1992). This finding supports the discriminant validity of the SCAS as an indicator of anxious, rather than depressive symptoms.

The relationship between SCAS scores and mothers' ratings on the internalizing subscale of the CBCL was then examined for the same sample of 218 children. No significant correlations were found between the SCAS total score and the internalizing or withdrawal scores on the mothers ratings on the CBCL ($r = 0.08$, $p > 0.05$), nor between the SCAS subscale scores and the CBCL Internalizing or Withdrawal scales (all $r$-values less than 0.09, $p > 0.05$). Similarly, mothers' ratings of internalizing problems on the CBCL did not correlate significantly with their children's scores on the CDI ($r = 0.11$) nor the RCMAS ($r = 0.09$). Thus, there was support for the convergent validity of the SCAS scores based on another child-report measure of anxiety, but not with respect to information regarding such problems provided by the mother.

The validity of the measure in terms of differential response of clinically anxious versus non-clinical control children was then examined. Three groups of children were involved in this study, namely 20 social phobic children, 20 comorbid social-separation anxious children and 20 non-clinical control group. Children were matched across groups in terms of age, gender and socio-economic status. There were 9 males and 11 females in each group. Exact age matching was not possible and age matches were selected within 1.5 years above or below the target age. There was no statistically significant difference in age between groups, $F(2, 57) = 2.56$, ns, with the mean age of the social phobics being 10.05 years (S.D. = 1.32), the non-clinical control group 9.15 years (S.D. = 1.95) and 9.00 years (S.D. = 1.41) for the comorbid social phobic-separation anxious group.

Mean values for SCAS and RCMAS scores for each of the three groups are shown in Table 5. Multivariate analysis of variance was used to compare the 3 groups using each of the six factors of the SCAS. This analysis revealed a significant difference between groups, Pillais $F(12, 106) = 5.15$, $p < 0.001$. Univariate ANOVAs indicated significant differences between groups for all factors, as shown in Table 5. Comparisons between pairs of groups showed that the only difference between the social phobic group and the non-clinical control group related to the social phobia factor, $F(1, 38) = 13.43$, $p < 0.01$ and the physical injury fear factor, $F(1, 38) = 6.13$, $p < 0.02$. The comorbid social-separation anxiety group, however, differed significantly from the non-clinical children on all factors (panic-agoraphobia symptoms, $F(1, 38) = 19.68$, $p < 0.001$, separation anxiety, $F(1, 38) = 57.50$, $p < 0.001$, social phobia, $F(1, 38) = 25.39$, $p < 0.001$, physical injury fears, $F(1, 38) = 23.40$, obsessive–compulsive problems, $F(1, 38) = 9.68$, $p < 0.01$, $p < 0.001$ and generalized anxiety symptoms, $F(1, 38) = 21.24$, $p < 0.001$). The comorbid social-separation anxiety group reported significantly higher scores than the social phobia group on the separation anxiety factor, $F(1, 38) = 18.73$, $p < 0.001$, obsessive–compulsive factor, $F(1, 38) = 4.14$, $p < 0.05$, physical injury fear factor, $F(1, 38) = 5.23$, $p < 0.03$ and generalized anxiety factor, $F(1, 38) = 4.85$, $p < 0.04$. No differences between the social phobia and comorbid social-separation anxiety groups were found for the

Table 5
Mean scores and standard deviations for SCAS and RCMAS for each group

| Measure | Non-clinical controls | | Social phobics | | Comorbid social + separation anx. | | Univariate ANOVAs | |
|---|---|---|---|---|---|---|---|---|
| SCAS Scale | mean | S.D. | mean | S.D. | mean | S.D. | $F(2, 57)$ | $p$ |
| Panic-agoraphobia | 1.55[a] | 1.85 | 4.45 | 0.61 | 7.10[b] | 5.28 | 6.17 | <0.01 |
| Separation anxiety | 3.15[a] | 2.01 | 4.95[a] | 3.62 | 10.40[b] | 3.78 | 27.24 | <0.001 |
| Social phobia | 3.25a | 2.57 | 7.30[b] | 4.22 | 8.80[b] | 4.20 | 11.75 | <0.001 |
| Physical injury fears | 2.20[a] | 2.33 | 4.15[b] | 2.64 | 6.10[c] | 2.75 | 11.42 | <0.001 |
| Obsessive–compulsive | 3.70[a] | 3.05 | 4.55[a] | 3.85 | 6.90[b] | 3.45 | 4.58 | <0.05 |
| Generalized anxiety | 4.95[a] | 2.96 | 6.80[a] | 4.14 | 9.45[b] | 3.44 | 8.13 | <0.001 |
| Total score | 18.80a | 9.72 | 32.20[b] | 21.97 | 48.75[c] | 17.66 | 15.18 | <0.001 |
| RCMAS total score | 6.20[a] | 4.27 | 14.55[b] | 6.93 | 16.85[b] | 5.83 | 18.77 | <0.001 |

Values with different superscripts indicate significant group contrasts ($p < 0.05$).

social phobia or the panic-agoraphobia factors ($F(1, 38) = 1.27$, $p = 0.27$; $F(1, 38) = 1.96$, $p = 0.17$, respectively).

### 3.9. Age and gender effects

Analyses of variance were conducted to examine age and gender differences in anxiety symptoms. Table 6 reports the means and standard deviations of SCAS total scores for each age and gender group. A significant effect was found for gender, $F(1, 2042) = 72.75$, $p < 0.001$, with girls tending to report significantly greater levels of anxiety symptoms than

Table 6
Means and standard deviations by age and gender for SCAS total scores

| | | Age | | | | | Combined age groups |
|---|---|---|---|---|---|---|---|
| | | 8 | 9 | 10 | 11 | 12 | |
| Males | mean | 31.29 | 26.70 | 27.01 | 28.34 | 24.10 | 27.20 |
| | S.D. | 18.65 | 16.16 | 16.32 | 16.26 | 13.18 | 16.15 |
| | $N$ | 110 | 243 | 195 | 167 | 136 | 851 |
| Females | mean | 37.08 | 35.50 | 34.68 | 32.87 | 31.80 | 34.14 |
| | S.D. | 21.47 | 18.78 | 16.92 | 16.19 | 16.65 | 17.57 |
| | $N$ | 105 | 270 | 302 | 326 | 198 | 1201 |
| Combined genders | mean | 34.12 | 31.34 | 31.67 | 31.34 | 28.67 | 31.28 |
| | S.D. | 20.22 | 18.10 | 17.07 | 16.29 | 15.77 | 17.35 |
| | $N$ | 215 | 513 | 497 | 493 | 334 | 2052 |

Table 7
Raw means and standard deviations by age and gender for each SCAS subscale score

| | | | Age | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 8 | 9 | 10 | 11 | 12 | Combined age groups | Effect, $F$ values ($df$) |
| Panic/agoraphobia | | | | | | | | | |
| 9 items | males | mean | 4.66 | 3.79 | 3.47 | 3.66 | 2.39 | 3.68 | |
| | | S.D. | 4.82 | 3.93 | 3.87 | 4.15 | 3.00 | 4.18 | |
| | females | mean | 6.18 | 5.35 | 4.69 | 4.33 | 3.97 | 4.95 | |
| | | S.D. | 6.00 | 4.64 | 4.36 | 4.26 | 4.04 | 5.22 | |
| | combined | mean | 5.41 | 4.61 | 4.21 | 4.10 | 3.33 | 4.27 | age, $F(4, 2042) = 10.20$, $p < 0.001$, |
| | | S.D. | 5.47 | 4.54 | 4.21 | 4.23 | 3.73 | 4.37 | gender, $F(1, 2042) = 41.58$, $p < 0.001$, |
| | | | | | | | | | age × gender, $F(4, 2048) = 0.83$, $p = 0.50$ |
| Separation | males | mean | 4.99 | 4.15 | 3.99 | 3.74 | 3.00 | 3.55 | |
| anxiety, | | S.D. | 4.03 | 3.35 | 3.06 | 2.83 | 2.55 | 3.97 | |
| 6 items | females | mean | 6.09 | 6.05 | 5.66 | 4.85 | 4.30 | 4.76 | |
| | | S.D. | 4.02 | 3.92 | 3.44 | 3.31 | 3.19 | 4.55 | |
| | combined | mean | 5.53 | 5.19 | 5.00 | 4.46 | 3.77 | 4.77 | age, $F(4, 2042) = 14.45$, $p < 0.001$, |
| | | S.D. | 4.05 | 3.77 | 3.39 | 3.20 | 3.01 | 3.50 | gender, $F(1, 2.42) = 77.55$, $p < 0.001$, |
| | | | | | | | | | age × gender, $F(4, 2048) = 1.14$, $p = 0.33$ |
| Social phobia, | males | mean | 5.41 | 4.87 | 5.46 | 6.10 | 5.83 | 5.49 | |
| 6 items | | S.D. | 3.91 | 3.42 | 3.66 | 3.44 | 3.40 | 3.58 | |
| | females | mean | 6.86 | 6.65 | 7.23 | 7.48 | 7.59 | 7.23 | |
| | | S.D. | 4.43 | 3.96 | 3.79 | 3.71 | 3.80 | 3.89 | |
| | combined | mean | 6.12 | 5.81 | 6.53 | 7.00 | 6.87 | 6.47 | age, $F(4, 2042) = 5.65$, $p < 0.001$, |
| | | S.D. | 4.22 | 3.81 | 3.83 | 3.70 | 3.72 | 3.84 | age, $F(1, 2042) = 84.80$, $p < 0.001$, |
| | | | | | | | | | age × gender, $F(4, 2048) = 0.28$, $p = 0.90$ |
| Physical injury | males | mean | 3.37 | 2.65 | 2.65 | 3.32 | 3.32 | 2.89 | |
| fears, 5 items | | S.D. | 3.14 | 2.68 | 2.72 | 2.65 | 2.65 | 2.71 | |
| | females | mean | 4.21 | 4.15 | 3.98 | 4.10 | 3.96 | 4.07 | |
| | | S.D. | 3.18 | 2.87 | 2.77 | 2.76 | 2.66 | 2.79 | |
| | combined | mean | 3.79 | 3.45 | 3.46 | 3.83 | 3.49 | 3.59 | age, $F(4, 2042) = 2.07$, $p = 0.08$, |
| | | S.D. | 3.18 | 2.87 | 2.82 | 2.74 | 2.62 | 2.83 | gender, $F(1, 2042) = 72.58$, $p < 0.001$, |
| | | | | | | | | | age × gender, $F(4, 2048) = 1.35$, $p = 0.25$ |
| Obsessive– | males | mean | 6.95 | 6.00 | 6.01 | 5.90 | 5.10 | 5.91 | |
| compulsive, | | S.D. | 3.95 | 3.65 | 3.57 | 3.79 | 3.42 | 3.69 | |
| 6 items | females | mean | 7.03 | 6.54 | 6.26 | 5.38 | 5.47 | 6.02 | |
| | | S.D. | 3.83 | 3.82 | 3.58 | 3.52 | 3.65 | 3.67 | |
| | combined | mean | 6.99 | 6.27 | 6.15 | 5.54 | 5.32 | 5.99 | age, $F(4, 2042) = 9.00$, $p < 0.001$, |
| | | S.D. | 3.88 | 3.75 | 3.57 | 3.62 | 3.56 | 3.69 | gender, $F(1, 2049) = 0.83$, $p = 0.36$, |
| | | | | | | | | | age × gender, $F(4, 2048) = 1.32$, $p = 0.26$ |
| Generalized | males | mean | 5.91 | 5.28 | 5.47 | 5.73 | 4.96 | 5.43 | |
| anxiety, | | S.D. | 3.28 | 3.36 | 3.31 | 3.41 | 2.82 | 3.27 | |
| 6 items | females | mean | 6.71 | 6.76 | 6.85 | 6.74 | 6.55 | 6.74 | |
| | | S.D. | 4.10 | 3.41 | 3.38 | 3.19 | 3.24 | 3.38 | |
| | combined | mean | 6.30 | 6.06 | 6.31 | 6.39 | 5.88 | 6.20 | age, $F(4, 2042) = 1.44$, $p = 0.22$, |
| | | S.D. | 3.72 | 3.46 | 3.42 | 3.29 | 3.17 | 3.39 | gender, $F(1, 2042) = 61.80$, $p < 0.001$, |
| | | | | | | | | | age × gender, $F(4, 2048) = 0.75$, $p = 0.56$ |

boys. There was also a significant effect for age, $F(4, 042) = 5.93$, $p < 0.001$, with a tendency for younger children to report higher total anxiety scores than their older peers. There was no significant interaction between age and gender for total SCAS scores $F(4, 2042) = 0.86$, $p = 0.49$.

In order to provide normative data for use in clinical practice, mean scores and standard deviations are reported for each age and gender group given that significant age and gender effects were evident for each SCAS subscale (see Table 7). Girls reported significantly higher scores than boys for all subscales except obsessive–compulsive symptoms, where no gender differences were found (panic-agoraphobia, $F(1, 2042) = 43.55$, $p < 0.001$, separation anxiety, $F(1, 2042) = 75.14$, $p < 0.001$, social phobia, $F(1, 2042) = 80.84$, $p < 0.001$, physical injury fears, $F(1, 2042) = 71.88$, $p < 0.001$, obsessive–compulsive problems, $F(1, 2042) = 0.70$, $p = 0.40$ and generalized anxiety, $F(1, 2042) = 62.02$, $p < 0.001$). Significant age level effects were found for the panic-agoraphobia, $F(4, 2042) = 12.13$, $p < 0.001$, separation anxiety, $F(4, 2042) = 15.39$, $p < 0.001$, social phobia, $F(4, 2042) = 5.26$, $p < 0.001$ and obsessive–compulsive problems, $F(4, 2042) = 9.11$, $p < 0.001$ subscale scores. Generally, there was a decrease in scores for these factors with increasing age (see Table 7), with the exception of the social phobia factor. Scores on the social phobia factor increased from ages 9 through to 12 years. No significant age effects were found for physical injury fears or generalized anxiety symptoms. No significant age by gender effects were evident for any of the subscales.

## 4. Discussion

This study examined the psychometric properties of a measure designed to evaluate anxiety symptoms among children. The SCAS was developed to assess a wide range of anxiety symptoms, while providing information about specific childhood anxiety disorders. The measure differed from the majority of child-report questionnaires that focus on more general physiological, emotional and behavioral indicators of anxiety.

Confirmatory factor analysis demonstrated that a model with 6 correlated factors provided a good fit of the data. The SCAS items were found to load strongly upon the factors that they were purported to measure, with all items loading significantly upon their hypothetical factor. The factor structure justified the subscales relating to separation anxiety, social phobia, obsessive–compulsive disorder, panic/agoraphobia symptoms, generalized anxiety and fears of physical injury. A high level of intercorrelation between factors was evident. A test of a higher order model supported the view that the intercorrelation between factors could be explained to a great extent by a higher order factor of anxiety in general. However, there was sufficient unique variance accounted for by individual factors to justify use of individual factor scores, in addition to the overall anxiety symptom score. These results replicate those reported by Spence (1997) who found a model with 6 first-order factors and a single 2nd-order factor to provide a good fit of the data for the SCAS with a large sample of children.

The SCAS was found to have high internal consistency, with subscales also showing acceptable levels of internal consistency. Test–retest reliability with a small subsample of children revealed an acceptable level of stability in children's total scores on the SCAS over a 6 month period. The stability of scores on individual subscales, however, was much lower. This

suggests that high levels of specific types of anxiety symptoms in children may be relatively unstable over time among the general population of children. Given that this study did not examine stability of clinically diagnosed anxiety disorders, this point cannot of course be generalized to clinical samples of anxiety disordered children for whom anxiety disorders have been found to be relatively stable over time if left untreated (Keller et al., 1992). The retest data revealed a significant tendency for children to report lower scores after the six-month interval. It is not clear the degree to which this decline reflects the impact of retesting or the result of increased age of the child. Previous studies and indeed the results of the present study, have demonstrated that children tend to report fewer fears and anxiety symptoms with increasing age on self-report questionnaires (Ollendick et al., 1996).

The convergent validity of the SCAS was supported by a strong correlation between the total SCAS scores and total score on a widely used measure of childhood anxiety, namely the RCMAS. The SCAS also correlated moderately with child-reports of depressive symptoms on the Children's Depression Inventory. However, the correlation between the SCAS total score and the CDI score was significantly lower than that between the SCAS total score and the RCMAS anxiety score. This finding supports the discriminant validity of the SCAS as an indicator of anxious rather than depressive symptoms. The relationship between the SCAS and mothers' ratings on the internalizing subscale of the Child Behavior Checklist was also examined as an evaluation of convergent validity. Contrary to predictions, no significant relationship was found between these measures. However, the lack of agreement between parent and child evaluation of childhood anxiety has been found in other studies (Silverman, 1994) and should not be taken as a criticism of the SCAS. Even where the same measure of child anxiety has been used in previous studies, correlations between parents and children have been relatively low. For example, Birmaher et al. (1997) reported a correlation of 0.30 between parent and child report on the total score of the SCARED. Thus, perhaps it is not surprising that correlations between parent and child report are even lower when different measures, using different questions and response formats are used, as in the comparison of the parent internalizing score on the CBCL and the child response to the SCAS.

Further support for the construct validity of the SCAS was obtained through comparison of two groups of clinically diagnosed children with a non-clinical control group. The clinically anxious children were identified from a diagnostic interview with the parents. Total scores on the SCAS were significantly higher among social phobics and comorbid social-separation anxious children than among the non-anxious children. Furthermore, the social phobic children scored significantly higher than the non-anxious controls on the social phobia subscale, providing support for the validity of the social phobia factor. In contrast, the comorbid social-separation anxious children reported significantly higher scores than the non-clinical control group on all 6 SCAS factors, including the separation anxiety factor. This suggests that the separation anxiety factor was sensitive to the diagnostic subtype of separation anxiety disorder. However, given that the anxious children involved in the present paper were specifically selected for a research study relating to social phobia, it would be valuable in the future to investigate the properties of the SCAS with a more diverse sample of clinically anxious children.

Significant age differences were found on 4 of the SCAS subscales, with mean scores declining with age for separation anxiety, obsessive compulsive symptoms and panic/

agoraphobic problems. The pattern of age differences was less clear for social phobia, for which symptoms appeared to increase between ages 9 to 11. In terms of gender differences, girls were found to report higher scores for the total score and all subscales except obsessive–compulsive symptoms, for which the were no differences between genders. This finding is in keeping with recent general population studies of the prevalence of clinically significant anxiety disorders in which higher rates of anxiety symptoms has been found for girls compared to boys (Anderson, 1994). The finding that obsessive–compulsive problems was the only cluster to be equally prevalent in boys and girls is also consistent with previous literature (March et al., 1995).

In summary, the SCAS was found to have acceptable psychometric properties and is likely to be a clinically valuable tool in the assessment of childhood anxiety. The measure provides an indication of symptoms related to specific forms of anxiety disorder among children. As such, it provides an advance on other child self-report measures that focus on the more general aspects of anxious behaviour.

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